

MDOT Research Priorities

Fiscal Years 2025/2026/2027

August 2023



Research Strategic Priorities & the Program Development Process

To utilize technology, maintain aging infrastructure, and tap into emerging modes of transportation, the Michigan Department of Transportation (MDOT) updates its research priorities every two years. The update must be grounded in the current and future needs of the transportation system as defined in the [Michigan Mobility 2045 Plan \(MM2045\)](#). It also must move MDOT closer to its vision:

To provide people with a safe, future-driven, interconnected multimodal transportation network that ensures equitable options.

MDOT Research Administration (RAAd) works to support this vision by defining the research priorities that support the state's transportation needs. MDOT also looks to national research programs and priorities when charting a path forward. The [USDOT Research, Development, and Technology Strategic Plan Fiscal Year 2022-2026](#) and [TRB CRITICAL ISSUES IN TRANSPORTATION 2019 with 2021](#) addendums for [COVID-19](#) and [racial equity](#) provide a framework of priorities.

With this clear vision, every two years, RAAd leads a [planning process](#) throughout the department to develop and approve their upcoming three-year candidate program of research projects. This three-phase process ensures that strategic priorities are directly linked to project selection and ultimately to the implementation of research results. RAAd leads this entire process to ensure that it is timely and effective, and that it conforms to all state and federal requirements.

The first phase in the three-year planning process is research idea development. During this phase, the Research Advisory Chairs (RAC) and Research Executive Committee (REC) identify priorities with focus area managers (FAM) and technical experts within the [Research Committee Structure](#). These priorities assist internal and external stakeholders in submitting research ideas that address these areas of focus during the call for research. Submitted research ideas are reviewed for consideration, selected, and amended as needed.

During the second phase of planning, project managers (PM) are assigned and convert the selected research ideas into problem statements, and RAAd compiles these statements into the three-year planning documents for RAC and REC approval. A problem statement clearly defines the objectives, tasks, schedule, and budget for a research project.

In the final phase of the planning and approval Process, RAAd obtains annual program approval and issues RFPs for the problem statements. Each summer, RAAd submits the upcoming fiscal year program for approval and provides a list of projects for which proposals will be requested.

The following pages provide the identified MDOT Research Priorities for the 2025, 2026, and 2027 fiscal years. The priorities are listed by focus area and grouped according to our research committee structure. A list of projects that resulted from the last call for research and other resources can be found on the Research Administration [website](#). A description of what is eligible for SPR II Research funds in section 5.1 of the [Research and Implementation Manual](#).

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Highways Development RAC

Bureau of Development Mission: *We will be a knowledge-based, service-oriented organization providing high-quality transportation project development services in support of the department's strategic goals.*

Environment & Water Resources

Hal Zweng

Goal 1: Provide easier access to environmental information.

Research Needs:

1. Identify invasive species management strategies and mapping locations within the MDOT right of way (ROW).
2. Identify sensitive water resources and alternative snow/ice management techniques to protect water quality.

Goal 2: Reduce frequency of wildlife vehicle collisions.

Research Needs:

1. Identify critical habitat connectivity locations in MDOT ROW. Information that will be used for future call for projects utilizing federal funding opportunities.

Innovative Contracting

Ryan Mitchell

Goal 1: Identify alternative contracting best practices to improve performance.

Research Needs:

1. Define benefits, best practices and lessons learned on progressive design-build.
2. Identify performance reporting best practices and procedures.
3. Identify and improve cost estimating best practices and procedures for alternative delivery programs.

Real Estate, Utilities & Permits

Larry Doyle

Mission: *The Development Services Division provides the highest quality services in real estate, permits, utility coordination, agreements, and local agency programs for all areas of MDOT.*

Goal 1: Develop tools and identify resources to create accessible and useful real estate and permit information.

Research Needs:

1. Make public parcel data that is collected and overseen by individual municipalities more publicly accessible and useful across the state. The Department of Technology, Management and Budget has a program to collaborate and share LiDAR and aerial imagery to locals in exchange for them

providing parcel information. It would be good to fund research on how to expand this program as this information is very useful to MDOT.

2. Develop a risk-based tool that assists in determining if identified ROW can be classified as excess and sold to private entities.
3. Identify the legal barriers, technology trends, and benefit/cost to developing and implementing new tools that support digital access to MDOT ROW information, oversize/overweight trucking permits, and ROW construction permits.

Project Development

Nathan Miller

Goal 1: Evaluation of available economic grass seed mixtures for Michigan.

Research Needs:

Evaluate and update the 2020 Standard Specifications for Construction grass seed mixtures outlined in table 917-2 which have not been updated in several versions of the specifications. Considering continuing grass seed shortages of specific species, as well as recent discussions on the quality of topsoil on trunkline projects, additional research is needed to ensure that the specified seed mixtures are available, economical, and successful.

Goal 2: Evaluation and prioritize the closure of rest areas.

Research Needs:

Due to ongoing budget constraints in the Rest Area Template, the department is investigating the potential for permanent rest area closures. The department had previously commissioned research project OR10-045 that evaluated rest areas economic value, completed in 2012. This previous research project requires updating to the current year, and considering how the economic landscape has changed since it was originally published. The final deliverable should be a ranking of prioritization for permanent closure, that when combined with existing data from Transportation Systems Management and Operations (TSMO) regarding rest area condition, can be used to guide the department in future actions.

Goal 3: Evaluate PVC water main materials in roadway projects.

Research Needs:

Historically, the department has discouraged the use of PVC water main materials within the influence of the roadway. However, with advances that may have occurred in material properties, in addition to the advent of fusible PVC, it is time to reevaluate this policy to ensure we are providing the most cost-effective and safe means to incorporate water main on department projects. The final deliverable should be a report with recommendations that can be presented to Engineering Operations Committee for any change in department policy.

Goal 1: Seamless transition of information from survey and design to construction, operations and maintenance, and asset management.

Research Needs:

1. Identify systems and processes to transition information developed in survey and design to construction contractors for project delivery as well as for MDOT inspection and installation activities. Removing duplicative efforts for developing and utilizing information is a key factor creating efficiencies for this information transfer.
2. Identify systems and processes to pass information developed in survey and design to asset management databases. Removing duplicative efforts in the development, collection, and utilization of this information is a key factor for creating efficiencies for this information transfer.
3. Identify how separate systems utilized for survey, design, construction, and asset management can be utilized based on a single source of truth to streamline processes and information transfers.

Goal 2: Understand and develop best practices for utilizing aerial survey techniques with unmanned aerial vehicles (UAV) for the department.

Research Needs:

1. Identify use cases and best practices for proactive slope stability monitoring along shorelines using UAV's. Develop a return on investment for monitoring critical areas with these methods.
2. Identify best practices and use cases for utilizing simultaneous localization and mapping (SLAM).



Highways Bridges & Structures RAC

Bureau of Bridges and Structures Mission: *We are devoted to the efficient and innovative design, construction, and active preservation of transportation structural assets, inspired by safety, resiliency, and mobility.*

Bridge & Structure Design & Construction

Brad Wagner

Goal 1: Guidance on Bridge Service Life – determine how we need to modify our materials such as concrete or coatings to achieve a certain service life.

Research Needs:

Recent national guidance and manuals have been developed on this topic and research is needed to determine what is available and how Michigan should implement the findings to achieve service life goals.

Goal 2: Life Cycle Cost Guidelines – additional guidance or tools are desired to help make life cycle cost decisions during scoping and structure study phase.

Research Needs:

Develop guidance and a tool to analyze life-cycle costs of various fix options based on realistic and likely interventions and accounting for future funding projections compared to ideal and cyclical scenarios. Compare projected outcomes with current practice.

Bridge & Structure Preservation & Inspection

Mike Halloran

Goal 1: Remediating Bridge Deck Cracking in Michigan

Research Needs:

Evaluate recent national research on this topic, particularly TR-782 Guide to Remediate Bridge Deck Cracking initiated by Iowa DOT and perform a similar analysis for the Michigan network of structures. This includes analyzing crack development and crack type/depth based on Michigan climate and design details, deck reinforcement protective coatings, and life cycle cost analysis comparing various crack remediations. Develop recommendations for future actions including intervention timing, product, and application methods.

Goal 2: Reducing bridge high-load hits and improving the methodology of analyzing structural steel damage caused by vehicular impacts or construction activities for load carrying capacity.

Research Needs:

1. Identify primary causes of structural high load hits and make recommendations on actions that can be taken to reduce the frequency and/or severity including education, industry outreach, technology solutions, modifications to design or retrofits. Look for cost-effective solutions to identify high load hits that are not reported through remote monitoring or other means. Also

consider bridge impact occurring within a work zone by contractors or sub-contractors and mitigation techniques.

2. Locate or develop load rating guidelines for analyzing steel girder damage caused by vehicular impacts or construction activities. Identify how material properties, service and fatigue limit states and ultimate strength may be affected and determine how MDOT can apply these affects resulting from damage. Typical damage may include out of plane bending, bent or distorted flanges or webs and cracked or gouged members.

Goal 3: Right Sizing our Bridge Network.

Research Needs:

Develop a scoring system that can be used to determine the criticality of a bridge asset to the transportation network looking at several relevant factors including, but not limited to mobility, equity, economic impact both current and future, network redundancy/detour length, connection of communities, emergency services response and non-motorized needs, historical significance, benefit/cost. The scoring system should be applied to the entire MDOT bridge network including NBI and non-NBI structures. The intent is that the score could be used for planning purposes to guide right-sizing decisions in scoping or pre-scoping and initiate public engagement discussions using a data driven approach.

Goal 4: Evaluate the feasibility of implementing a Michigan bridge washing/flushing program.

Research Needs:

Look at other research that has been done on this topic with comparable bridge networks and determine what information may be applicable to Michigan, identify existing evidence using a comparative analysis, and/or perform laboratory tests to quantify the long-term benefits of bridge washing, determine the resource needs for MDOT to implement such a program, and make a recommendation based on the findings.

Geotechnical & Foundation Design

Ryan Snook

Goal 1: Improve MDOTs understanding of the acceptance and performance of riprap.

Research Needs:

Determine the gradation of riprap with alternative methods other than the Wolman count.

Goal 2: Improve MDOTs ability to obtain geologic information while drilling cores.

Research Needs:

Determine the applicability/correlations of measurement while drilling (MWD) in Michigan geology.



Highways Delivery & Operations RAC

Bureau of Field Services Mission: *We provide leading edge services and solutions.*

Construction

Lindsey Renner

Goal 1: Pilot a work zone test of digital speed limits signs and worker location devices.

Research Need:

Evaluate the effectiveness of digital speed limit signs that will be changed based upon worker location. This worker location will be based on a device and proximity that each work crew will have. Reviewing the driver behavior and speeds of vehicles and performance of the system could be of interest. The speed limits signs will be broadcasting a Work Zone Data Exchange (WZDx) feed that will allow for the speed limit to be displayed in vehicles.

Goal 2: Understand the validity of the data that is posted on MI Drive. If MI Drive is going to be a source of information broadcast to vehicles there needs to be a high level of confidence and checks into how correct and accurate this data is.

Research Need:

Evaluate the validity of the data that is posted on MI Drive. This should be compared to a connected work zone and a standard work zone with manual inputs in multiple locations. Research into this area will most likely highlight the need for higher quality data and quantify the benefit of adding connected devices to work zones. Studies should look at compliance rate of posting and tracking of lane closures including start and end time and location accuracy.

**Kim Zimmer (interim)
& Hilary Owen**

Intelligent Transportation Systems & Signals

Goal 1: Improve the cost effectiveness of the signals program through possible signals program policy and scope changes.

Research Needs:

1. Examine the reuse of strain poles. Currently older poles are removed and replaced rather than evaluated for reuse. Could an evaluation program be established to determine the strength of the older poles and savings be realized with reuse?
2. Analyze box span signals in intersections in rural versus urban environments to determine the best use of box span signals and identify the locations that they do not provide a justified return on investment.
3. Examine the types of detection for increased accuracy. Grid smart cameras could be compared to pavement embedded loop detection to determine the characteristics of intersections that perform best with each system to justify a system selection standard. MDOT currently uses multiple types of detection based on region office preferences. Technology changes quickly, so a research project would need to be proactive and factor in future improvements.

Goal 2: Improve MDOTs use of advanced technology for signal performance measures:

Research Needs:

1. Develop techniques to measure signal performance using available data in real time if computational power and data set availability is sufficient. Improvements could be realized by using Prob data to time our traffic signals versus field data which is more labor intensive. A study would need to include compatibility with Centrac by Econolite and Siemens controllers as MDOT has invested in these systems statewide.
2. Develop an understanding of the key data analytics and sources of data for metering traffic flow at ramps successfully. Data sources could include prob data or field detectors.
3. Develop techniques to utilize hard breaking data from the auto industry (i.e., Ford, GM, Google, etc.) to better time signals.
4. Analyze bus specific data in relation to signal performance to understand the improvements that can be realized through preemption of signals for bus priority.

Fleet & Facility Management & Operations

Diane Sevigny

Goal 1:

Research Need:

1. Evaluate corrosion-resistant coatings and retrofits for salt storage facilities. Identify additional measures MDOT can take to reduce corrosion and more effectively manage salt storage facilities.
2. Evaluate solar and photovoltaic panel installation viability, cost/benefit ratios, and long-term substitutability for state owned buildings.
3. Identify and recommend Wi-Fi, network connectivity for rural areas to provide adequate infrastructure to support MDOT garage operations.
4. Evaluate road condition impact on drainage ditches with a specific focus on Michigan Department of Environment, Great Lakes, and Energy concerns.
5. Evaluate winter road maintenance contingency of services. Identify what level of redundancy and back up equipment and labor are best suited for MDOT if local government opts out or no longer can provide services.
6. Develop a fleet and rolling stock equipment replacement schedule. Evaluate the optimal cost/benefit ratio to ensure best investment when considering total cost of ownership to full replacement of a piece of equipment.
7. Develop a methodology for determining optimal location for maintenance garages based on factors like roadway types and lane miles. Conduct an assessment and make recommendations.

Roadway & Roadside Maintenance

Jason Bodell

Goal 1: Leverage data from existing MDOT systems and/or programs that are applicable to maintenance operations to improve operations, increase effectiveness, develop performance metrics, etc.

Research Needs:

1. Leverage data from these programs to create opportunities for incorporating into a needs-based budgeting process.
2. Evaluate and analyze routine and winter maintenance budgeting, including economic impacts/benefits, performance, and other factors, to determine an ideal statewide maintenance budget.
3. Evaluate the current pump station facilities, weather data, and Supervisory Control and Data Acquisition (SCADA) data to determine base flow rates in comparison to rainfall intensity. Furthermore, include the use of predictive analytics to determine a risk level for flooding at certain pump station locations based on forecasted rain fall and or other data.
4. Evaluate the use of UAVs for lighting and their effectiveness on night work productivity and safety.
5. Evaluate mineral well brine sources and use considerations for winter operations at MDOT.
6. Evaluate the use and effectiveness of UAVs and other technology to measure salt and sand stockpiles quickly and accurately within a storage facility.
7. Identify use cases and develop the framework for decision-support tools that could be created for maintenance utilizing existing data sources.

Mobility & Traffic Incidents

Tim Croze

Goal 1: Enable research that supports mobility to operate and manage an optimized, integrated transportation network by delivering high-quality services for safe and reliable travel for all users.

Research Needs:

Identify best practices and make recommendations to establish an integrated program that optimizes the performance of existing multimodal infrastructure by implementing systems, services, and projects to maximize capacity and improve the security, safety, and mobility/reliability of the transportation system.

Goal 2: Leverage data from existing MDOT systems and/or programs that are applicable to mobility and traffic incident management to improve operations, increase effectiveness, develop performance metrics, and encourage collaboration.

Research Needs:

Develop or identify solutions to provide more efficient use of existing transportation resources by implementing strategies, deploying technologies, and integrating systems to address freeway and arterial congestion, improve safety and mobility and encourage sustainability.

Goal 3: Develop tools that assist in balancing competing priorities and quantify safety and mobility impacts in the annual call for projects.

Research Needs:

Provide guidance and value to the development of an innovative and cohesive Transportation Systems Management and Operations (TSMO) program.

Goal 1: Study causes of premature concrete deterioration and effects of alternate deicer chemicals on concrete deterioration.

Research Needs:

Although concrete durability has improved greatly over the last decades, there are still cases of premature deterioration and concrete decay that appear to be related to cementitious materials used and how they react to deicer chemicals and freeze thaw cycles. Simulate the effects using newly developed and existing test procedures. Refine specifications and mixture designs accordingly.

Goal 2: Develop a better understanding of the effects of curling and warping on ride quality and evaluate of MDOT's current joint design spacing for Portland Cement Concrete (PCC) pavements.

Research Needs:

Most of the theoretical studies for this topic have been completed. Develop an instrumentation system that can be installed in fresh concrete that can measure this phenomenon as the concrete transitions from a fluid to a solid and during the first five of years in service. A durable system is needed because it is known that warp can take 3 to 5 years to develop in concrete slabs. This goal is the next phase of research following research project OR24-005.

Goal 3: Continue the on-going state-specific calibrations to the mechanistic-empirical pavement design performance prediction models.

Research Needs:

Establish and monitor a cluster of highly documented Michigan test pavements that will have their performance measures tracked over time in detail. The Michigan test section data will be used as the basis for determining revised "calibrated" performance prediction regression model coefficients that better reflect Michigan climate/materials pavement performance, rather than using the nationwide default regression model coefficients. Most states are involved in these types of "local calibration" studies.

Goal 4: Evaluate the effects of heavier alternate fuel vehicles relative to typical gas or diesel vehicles on pavement damage rates.

Research Needs:

The increased weights of newer battery powered vehicles can cause increased rutting and fatigue damage to pavements. Assess the theoretical aspects of the increased vehicle weights and available case study research on the potential for increased pavement damage.

No Research Priorities

Goal 1: Eliminate fatal and serious injury crashes on Michigan’s roadways by applying the Safe System Approach through statewide strategies and initiatives that accommodate human mistakes and injury tolerance levels to move Michigan Toward Zero Deaths.

Research Needs:

1. Seek and identify Safe System Approach practices which can be implemented into various areas of the department as MDOT moves forward in supporting the goal of zero fatalities and serious injuries by 2025.
2. Identify new crash countermeasures/infrastructure improvements that leverage emerging transportation technologies related to vehicle-to-vehicle communication and vehicle-to-infrastructure communication.
3. Review safety-related best practices, resulting from past and current research, and recommend implementation, training, and communication strategies.
4. Develop tools that assist in balancing competing priorities and quantify safety impacts in the annual call for projects through the incorporation of the Safe System Approach.
5. Develop and recommend statewide/regional safety strategies that can be implemented by MDOT in support of Toward Zero Deaths for all road users.
6. Continue to evaluate the setting and promotion of safety targets to serve as a benchmark in our goal of Toward Zero Deaths.



Multi-Modal Transportation & Finance RAC

Aviation

Bryan Budds

Mission: Develop and preserve a safe, high-quality statewide air transportation system.

Goal 1: Provide additional weather-related safety critical data to Michigan pilots in close to real time.

Research Needs:

Michigan is home to a robust system of automated weather observation stations that provide high quality weather data to Michigan pilots through existing state and federal processes. Recently, additional capability has entered the market that would supplement existing weather station capability with near real-time video feeds. Explore the deployment of this technology in coordination with our existing systems.

Goal 2: Explore emerging aviation fuels, their viability, and how new fuels may impact the aviation system.

Research Need:

All airports in Michigan are accustomed to two primary fuels – 100 low-lead aviation gasoline and jet fuel. With increasing pressure to limit greenhouse gases and lead emissions from aviation fuel – the industry is preparing for new fuels – including electrification, sustainable aviation fuel (SAF), hydrogen, and several others which will have a significant impact on not only existing “gallons-based fuel tax systems” but also on the infrastructure needed to dispense these new types of fuels. Research is needed to better understand these issues and explore the feasibility of deploying pilot systems at select airports.

Goal 3: Prepare for the future of electric and autonomous aircraft.

Research Need:

The aviation industry has reached a time of significant transformation in terms of the type of aircraft entering the national airspace system. Ultimately, there is significant interest in fully autonomous aircraft moving people and goods across a regional transportation network. While Aeronautics believes that is likely to happen, we believe the first deployment of advanced aircraft will be piloted electric vertical take-off and landing (eVTOL) or electric short take-off and landing (eSTOL) aircraft. Both aircrafts by their nature would significantly transform the types of facilities needed to operate such aircraft, with much smaller areas required for operation but with additional electrification infrastructure not generally available at traditional airports. Building upon work achieved in a currently underway unmanned aircraft feasibility study, Aeronautics would like to examine and deploy the state’s first electric aircraft vertiport and charging station needed to support these already on the market aircraft, including several that are being developed and deployed in Michigan. We believe there are opportunities to collaborate with the connected and autonomous vehicle team on electrification opportunities at areas like MDOT rest areas or existing MDOT-owned airports in southeast Michigan.

Freight Logistics & Maritime

Elisha Wulff

No Research Priorities

Goal 1: Evaluate the safety of and identify best practices for rails-with-trails.

Research Needs:

1. Rails-with-trails are multi-use trails that run alongside active rail lines.
2. MDOT's current rails-with-trails along state-owned rail corridors policy was established in 2017.
3. As trails have become more prevalent along the railroad corridors and national data and incident reports are limited, research is needed to determine the design aspects necessary to enhance safety of such trails while providing answers to the following questions:
 - a. What safety data currently exists?
 - b. What levels of incidents and fatalities have been recorded on rails-with-trails?
 - c. How does this data compare to trails along roadways?
 - d. Is the risk of train derailment a safety concern for rails-with-trails?
 - e. How does the risk of train derailment compare to the risk of a vehicle crash along a roadway when a trail is adjacent to rail or road corridor?
 - f. Is there a design standard distance from the rail line to locate a multi-use trail to enhance safety?

Local Transit

Mission: Providing Michigan Citizens with The Best Passenger Transportation Services Through Quality Customer Assistance - We Move People.

Goal 1: Preparing for the future of public transportation.

Research Needs:

1. Determine how technological changes have evolved the way transit is implemented as a service and determine the state's role in mobility as a service and mobility on demand, considering all the services that encompasses (i.e., cell phones, computerized mapping, and scheduling, google, social platforms).
2. Develop strategies for future local and long-distance passenger transportation systems that account for changing demographics, changing customer needs/preferences, emerging vehicle technologies including automated vehicles, emerging private sector passenger transportation services (Uber, Lyft, etc.) and shared use mobility services.
3. Develop future federal and state funding strategies, related to technical assistance and regulatory programs, that will account for future passenger transportation changes.

Goal 2: Improving equity and access to mobility services.

Research Needs:

1. Identify barriers to accessing mobility services and strategies to mitigate them.
2. Determine the state's role in equity as it relates to private transportation services that are offered to the general-public.

No Research Priorities

Contract Administration

Carol Rademacher

Mission: *To provide the highest quality contract, records, and forms services to our customers in support of MDOT's mission.*

No Research Priorities

Finance

Adam Feldpausch

Mission: *To provide quality financial and administrative services to optimize the accomplishment of MDOT's mission.*

Goal 1: Determine the benefits of bonding versus pay-as-you-go infrastructure investment and of Federal Highway Administration (FHWA) financial plans to better focus MDOT resources.

Research Needs:

1. Determine the value of financing infrastructure improvements through bonding versus a program of pay-go improvements. Compare the debt service costs of bonding against the increased costs of inflation, increased costs related to the deterioration from delayed improvements, sunk costs for targeted maintenance and repairs, and user delays from constraints of a pay-go approach.
2. Investigate the benefit of required FHWA financial plans. Do the initial financial plans and annual updates provide controls to cost escalations or improve the final project delivered? What value are they providing to FHWA, the department and the project?



Planning & Organizational Development RAC

Data Inventory & Integration**Wendi Burton**

***Mission:** Turn data into information and information into knowledge.*

Goal 1: Improve the safety, efficiency, and cost-effectiveness of data collection and the integration of geospatial solution and services required to meet reporting and operational functions.

Research needs:

1. Identify best practices and lessons learned of moving data to the cloud via a literature review of other DOT's.

Goal 2: Improve trunkline and non-trunkline travel monitoring program.

Research Needs:

1. Study options for usage of passively collected traffic data in travel monitoring programs. Survey other State DOTs to understand if and how they make use of passively collected traffic data in their programs.
2. Research best practices for developing and maintaining continuous count stations on non-state-owned roads and assess considerations unique to Michigan.
3. Update previous research on the feasibility of using ITS data to enhance MDOT's travel monitoring program and research the feasibility of using data from traffic signals as part of MDOT's travel monitoring program.

Goal 2: Improve downstream applications for Geospatial Information System (GIS) and Advanced Linier Reference System (ALRS) data.

Research Needs:

1. The Roads & Highways Advanced Linier Reference System (ALRS) is normalized data that does not output multiple data events aligned in segments (such as intersection to intersection records) without a large resource commitment each year from Data Oversight and Geospatial Management Section staff. The process to convert data to be consumed by Roadsoft is stable. However, long term, we see risk for MDOT, Roadsoft, and the State of Michigan Transportation Asset Management Council (TAMC) based on changing technology (process over 20 years old) and single source dependencies. The alignment process across data events is half the battle, and already being addressed for the Highway Performance Monitoring System (HPMS) needs. This research looks after the data is internally aligned and how aligned data would be consumed by downstream applications. The level of effort and resources would be included in the findings. These results could also be useful for MDOT's Data Integration & Data Warehouse Design (DIWD) effort.
 - a. Research what efficient Integration options are available for downstream applications, such as Roadsoft, to consume our normalized Geospatial Information System (GIS) ALRS edits and be able to migrate information to segment-based GIS and non-GIS databases on different platforms.
 - b. Research what efficient Integration options can be developed for downstream applications, such as Roadsoft, to consume our normalized GIS ALRS data/edits and be able to migrate information to segment-based GIS and non-GIS databases on different platforms.

Non-Motorized Planning & Development

Deb Alfonso

Goal 1: Develop tools and methods that enable Active Transportation needs and facilities to be mainstreamed into transportation decision making processes.

Research Needs:

1. Develop a model for inventory of bicycle and pedestrian facilities that encompasses both on-road and off-road locations. Recommend best options for incorporating related data collection into existing business processes, both MDOT and local, to assist with future planning in support of Complete Streets.
2. Explore best practice methodology for assessing the needs of pedestrian and bicycle networks in all infrastructure plans and projects.
 - a. Identify strategies to eliminate gaps or address barriers in each system.
 - b. Develop tools appropriate to Michigan for incorporating improvements.

Program Development

Craig Newell

No Research Priorities

Asset Management & Policy

Eric Mullen

No Research Priorities

Travel Demand & Forecasting

Karen Faussett

Goal 1: Integrate real time speeds with travel demand model forecasts to serve as input to the MOVES air quality transportation conformity emissions model.

Research Needs:

1. MDOT Statewide and Urban Travel Analysis Section is required to run the EPA's Motor Vehicle Emission Simulator (MOVES) model for transportation conformity analysis. Having better local speed data will make conformity analysis more precise and will provide more accurate analysis. This analysis is increasingly more important in the transportation field given current issues such as carbon reduction, climate change, resiliency, greenhouse gasses (GHGs), and electric vehicles. MDOT utilizes the MOVES model but is looking into using it for GHG. The MOVES model requires Vehicle Miles Traveled (VMT), hourly VMT divided by hourly average speed (VHT), and speed inputs for long range plan forecast years, reflecting the planned projects for future years. The current source of this forecasted data is the travel demand model. Travel demand models are calibrated based on volumes and often do not provide accurate speed data.
 - a. MDOT has access to real-time INRIX speed data through the Regional Integrated Transportation Information System (RITIS) platform. The challenge with using this data is that it is not forecasted. Additionally, it isn't provided in a format that matches to model road networks perfectly.
 - b. We are proposing a research project to identify how real time speed data can be obtained through the RITIS platform, forecasted using the travel demand model, and processed into a format that can be input into MOVES.

Goal 1: Recruit high-quality employees.

Research Needs:

1. Study how other states and agencies measuring recruitment effort return on investment and identify data-driven strategies.
2. Identify best practices around diversity, equity, and inclusion (DEI) recruitment including measuring effectiveness of efforts.
3. Research how other DOTs determine classification and pay scale for hard-to-fill, hard-to-keep positions, and fields.
4. Identify Civil Service job specifications with limited degree qualifications for possible inclusion of additional fields of studies. Identify how other DOTs determine degree qualifications for these fields.

Goal 2: Retain and develop a high-performing workforce.

Research Needs:

Identify strategies that will assist MDOT leadership in encouraging buy-in to workforce and organizational development across the department. Recommend strategies that will foster employee engagement, participation, and buy-in.